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ABSTRACT

Patterns of code switching were studies from two aphasic and two neurologically normal Kannada-English bilinguals. Conversational analysis of the samples based on the Matrix Language Frame (MLF) model (Myers-Scotton, 1993) revealed consistent code switching between two languages by all the subjects. The aphasic subjects demonstrated a greater frequency of MLF constituents and mixing at the morphological level, but there were no differences in terms of the quality of the switches. Results suggest an increased dependence on both languages for communication following aphasia. This study provides some insights into the pattern of code switching between Kannada and English and also signals ways to structure assessment in bilingual aphasics accordingly. (Contains 23 references.) (Author/SM)

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Abstract

Patterns of code switching were studied from two aphasic and two neurologically normal Kannada-English bilinguals. Conversational analysis of the samples based on Matrix Language Frame (MLF) model (Myers-Scotton 1993) revealed consistent code switching between two languages by all the subjects. The aphasic subjects demonstrated a greater frequency of MLF constituents and mixing at morphological level but there were no differences in terms of the quality of the switches. Results suggest an increased dependence on both languages for communication following aphasia. This study provides some insights into the pattern of code switching between Kannada and English and also signals ways to structure assessment in bilingual aphasics accordingly.

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Code switching is a practice constrained by grammatical principles and shaped by environmental, social and personal influences (Milroy and Wei 1995). There are several factors crucial to understanding of code switching like the community in which it takes place or mode of the bilingual speaker. Some communities accept code switching within a single context as the norm for communicative interactions whereas others maintain a strict distinction between the languages (Heller 1995). It is thus imperative to study code switching in a proper linguistic and cultural context.

Language mode is an important factor to be considered in any study on bilingual aphasia. Language mode is the state of activation of bilingual's languages and language processing mechanisms at a given time (Grosjean 2000). A bilingual can be on a continuum depending on the situation he is in. At one end they may be in monolingual mode where there would be ideally no mixing and at the other end they find themselves in a bilingual mode mixing languages freely (Grosjean 1982). The movement of a bilingual along the continuum results in varying language behaviors. Earlier research paid little attention to language mode but as Grosjean (2000) highlights, it needs to be controlled in any bilingual experiment by evaluating monolingual and bilingual modes on different days with different interlocutors. In the present study an attempt has been made to do so.

Bilingual aphasic speakers like normal bilinguals, need to alternate and use context appropriate languages. Sometimes the deficit in linguistic competence may affect this ability to alternate the linguistic codes (Munoz, Marquardt and Copeland 1998). Bilingual aphasics have been seen to combine languages in a variety of ways. They may use several languages together in same utterance (Gloning & Gloning, 1965; Mosner & Pilsch, 1971) or produce the correct name of an object in an unsolicited language (Gloning & Gloning, 1965; Weisenburg & Mcbride, 1935;) even when it is impossible for the same patient to produce the correct name in that language upon request. Junque, Vendrell, Vendrell-Beret and Tobena (1989) and Paradis (1995) suggest that mixing of languages is frequently observed recovery pattern among bilingual aphasics.

One of the earliest detailed reports on language mixing was by Perecman (1984) of a 80-year-old male who suffered extensive bilateral temporal hematomes resulting from a car accident. Data was analyzed for different levels (phonological, morphological, lexical-semantic and syntactic) of code switching. She concluded that language boundaries are poorly delineated in polyglot aphasic's mental grammar and remarked that utterance level mixing and spontaneous translation are abnormal behaviors seen in bilingual aphasics. Grosjean (1985) contradicts these findings by specifying that

utterance level mixing is not unique to bilingual aphasics as suggested by Perecman (1984). He pointed out that the interlocutor in the above study was a multilingual who mixed languages and this in turn could have triggered language mixing in subject as a communicative strategy. He identified factors such as language mode, pre morbid language use and test constraints as strategic in any study dealing with language mixing.

Hyltenstam (1995) analyzed samples of language mixing from 31 cases of bilingual aphasia reported in literature using Poplack's syntactic constraints and the MLF (matrix language frame, Myers-Scotton 1993) model. He found that it is reasonable to believe that the code switching of aphasic speakers is structured according to same conversational constraints as in normal speakers. Munoz, Marquardt and Copeland (1998) pointed to methodological shortfalls that comprised data interpretation such as little information about pre morbid language use, presence of bilingual interlocutors, limited samples and lack of controls.

In order to overcome these, Munoz, Marquardt and Copeland (1998), compared the code switching patterns of aphasic and neurologically normal bilingual speakers of English and Spanish using Matrix language frame (MLF) model. Communicative difficulties resulting from code switching with monolinguals and ungrammatical switches were noticed only in speech of bilingual aphasic subjects. Individuals in both the groups also exhibited the use of a second language in the monolingual context and spontaneous translation, behaviors considered inappropriate earlier by Grosjean (1985) and Junque, Vendrell, Vendrell-Beret and Tobena (1989). They concluded that the patterns of code switching in bilingual aphasics suggest that they are adapting normally occurring code switching patterns to enhance their communicative effectiveness. In this study a good attempt was made to control many variables and evaluate code switching relative to a particular cultural context. They however did not systematically evaluate two languages of bilingual aphasics using an equivalent test like Bilingual Aphasia test (Paradis and Libben 1987).

Matrix language frame model (Myers-Scotton 1993) that is used in the present study is based on research on linguistic performance, in particular research on sentence production. The constituents are classified based on the relationship between matrix language and the embedded language. Matrix language (hence forth referred to as ML) is the base language of the conversation contributing the most system morphemes to the interaction and sets the morphosyntactic structure of the utterance. Most of the system morphemes will occur in ML whereas content morphemes can be accessed in the either language. Embedded language (hence forth referred to as EL) is the less active language inserted into the structure established by the matrix language.

The three way distinction among constituents in the code-switched utterances: I) Matrix language (ML) islands include constituents made up of only morphemes from the matrix language II) Embedded language (EL) islands are constituents made up of only EL morphemes within an other wise ML structure and III) ML + EL constituents are mixed utterances. There are totally seven categories of MLF; four MLF categories have their basis in the hierarchical relationship between ML and EL. The three additional constituent categories are borrowed forms, EL insertions and revisions that were added

later on by Munoz, Marquardt and Copeland in 1998 to account for the kind of utterances seen in aphasic productions.

Table 1: Definition of matrix language frame constituents

Sl. No.	Constituent	Definition
1.	ML islands	Well-formed constituents consisting entirely of ML morphemes demonstrating syntactic structure.
2.	ML shift	Change in ML in consecutive utterances or clausal structures.
3.	EL islands	Well-formed constituents consisting of at least two EL morphemes showing syntactic structure inserted into ML.
4.	ML+EL	A single EL lexeme (not a borrowed form) inserted into the syntactic frame of any number of ML morphemes.
5.	Borrowed form	A lexeme from one language incorporated into morpho-syntactic frame of other language and judged as widely used by the native monolingual speakers of that language.
6.	EL insertions	Multiple EL insertions demonstrating no syntactic structure inserted into the syntactic frame of any number of EL morphemes.
7.	Revisions	Lexical insertions that do not contribute to the meaning of an utterance including speech errors, circumlocutions, restatements and indicators of word-finding problems.

In the south Indian state of Karnataka where this study was carried out, 1991 census shows English as second language for 9.44% and third language for 2.54% of people. The language spoken by majority of the people is Kannada and it is the official language of the state. On the other hand English serves a prestige function and has entered the realm of the social life as well. Kannada-English code switching is quite frequent in normal literate bilinguals and there is abundance of borrowed English words in repertoire of Kannada speakers (Bhat and Chengappa 2003). There is little information concerning code switching in normal Kannada-English bilinguals and only one study has been carried out on code switching in bilingual aphasics in Indian languages by Krupa 2002. She investigated code switching in Malayalam-English bilingual aphasics and

evidenced disruptive increase in this behavior in terms of increased revisions, embedded language insertions and deficits in lexical retrieval resulting in increased code switching.

Above review indicates need for more inter and intra language code switching studies in Indian languages. This study intended to investigate similarities and differences in the code switching behavior of Kannada-English aphasic and neurologically normal bilingual speakers in a conversational discourse.

2. Method:

2.1 Subjects:

Two aphasic and two neurologically normal adults matched on basis of age, gender, education and language use participated in the study. Western aphasia battery (Kertesz and Poole 1974) and a short version of bilingual aphasia test (Paradis and Libben 1987) were used to compare the aphasic symptoms in two languages. Bilingual refers here to those individuals who have learnt Kannada as their first language and have at least minimal vocational proficiency in English (pre morbid English proficiency in case of aphasics) as revealed by ASLPR (Australian second language proficiency rating, Ingram 1985). ASLPR is applied as rater matches the learner's language behavior against one of the performance descriptions in the scale. It rates the user from zero fluency to native like fluency in four language areas of speaking, listening, reading and writing. Normal controls and aphasics were matched on language use on ASLPR and Part–A of Bilingual aphasia test (Paradis and Libben 1987). Controls were all right handed and had no history of neurological, sensory, emotional or communicative impairment.

2.2 Procedure:

All the subjects participated in three conversational tasks, each with a different communication partner: monolingual Kannada, monolingual English and bilingual (both languages within a single conversation). The communication partners were experienced speech language pathologists who were knowledgeable of the purpose of the study and spoke only the assigned language. This was done in order to approximate communication breakdown that occurs when a language unknown to a conversational partner is employed. To control the language mode these three samples were collected on different days and subjects were made to listen to passages in assigned languages. In all three contexts subjects were given topics to speak, which were balanced for the emotional content i.e. monolingual Kannada: family; monolingual English: Hobbies; bilingual: work.

All the conversational partners spoke to subjects for sometime before the recording in order to build an informal atmosphere. This was specifically given more importance in bilingual contexts in order to facilitate code switching. The conversations were audio recorded and the extra linguistic behaviors accompanying the conversation were also noted.

2.3 Transcription:

The first 85 utterances from each context (225 total) were transcribed. Utterances were identified by suprasegmental markers such as rising or a lowering of pitch or a pause of two or more seconds.

2.4 Analysis:

Each word was coded as Kannada or English. The data was analyzed for constituents of the MLF model and levels of code switching. Any lexical insertion was reviewed by 3 native speakers of Kannada not knowing English on 1 to 3 rating scale (How often do you use this word? 1 = never, 2= rarely and 3 = frequently). Those lexemes with rating of 3 by at least two out of three raters were considered borrowings. Utterances containing borrowed forms were coded as ML islands due to high level of integration of these lexemes into the base language and the frequent usage by monolinguals of that language.

3. Results:

Subject A1 was a 78-year-old male with a history of left MCA infarct in the anterior division diagnosed after a neurological examination and computerized tomography. He was born in the South Indian state of Karnataka (Mysore city) where Kannada is the major language. His first language was Kannada and he started learning English at the age of 6 years as the medium of instruction as well as his second language, which he could read and write proficiently. WAB (Western aphasia battery, Kertesz and Poole 1974) revealed Broca's aphasia and BAT (short version) revealed parallel deficits across Kannada and English.

A2 was a 36-year-old female who suffered left parietal thrombotic CVA. She was also born in Karnataka (Mysore city) and had acquired Kannada as her first language. She started learning English at the age of 6 years, which continued to be her medium of instruction and her second language. WAB revealed anomia and BAT (short version) showed parallel deficit in Kannada and English.

Both the normal subjects were from the same region and reported of having English as their medium of instruction and second language since six years of age (see Table 2).

Results from language questionnaire pointed to the use of mixed language (Kannada and English both) in everyday life by all the four subjects.

The frequency of code switching was noted for all the subjects. The results are described in terms of constituents of MLF and the levels of code switching.

Table 2: Demographic details of subjects

	A1	A2	N1	N2
Gender	Male	Female	Male	Female
Age	78	36	78	36
Education	Graduation	Post graduation	Graduation	Post graduation
Native language	Kannada	Kannada	Kannada	Kannada
Language of education	Kannada/ English	Kannada/ English	Kannada/ English	Kannada/ English
Language used with spouse	Kannada	Kannada	Kannada	Kannada
Language used with children	Kannada/ English	Kannada/ English	Kannada/ English	Kannada/ English
Language used at work	Kannada/ English	Kannada/ English	Kannada/ English	Kannada/ English
Aphasia type in Kannada	Broca's	Anomia	-	-
Aphasia type in English	Broca's	Anomia	-	-

3.1 Language choice:

In both the monolingual conditions, the matrix language islands were in the same language as spoken by the interlocutor (assigned language).

In bilingual context, all the subjects except A1 used Kannada as the ML. There were no ML shifts in monolingual condition. A1 shifted ML five times whereas there were only two ML shifts in speech of N1, A2 shifted ML once and N2 did not show any ML shift in the bilingual context preferring to use only Kannada (Table 3).

Table 3: Frequency of ML constituents produced by subjects

Subject/Language	Language/ Constituent		
	Monolingual English/ ML island	Monolingual Kannada/ ML island	Bilingual/ ML island
A1 / English	85	0	80
A1 / Kannada	0	85	5
N1 / English	85	0	2
N1 / Kannada	0	85	83
A2 / English	85	0	1
A2 / Kannada	0	85	84
N2 / English	85	0	0
N2 / Kannada	0	85	85

Following are examples of ML shift, A1 shifting from English to Kannada see example (1) and vice-versa in others see examples (2) and (3).

Example (1):
A1: I wanted to come back. My boss asked uh *...ya:ke ninage be:ja:ru*?
Are you not happy?

Example (2):
N2: nanu hannandu varsha munche kelsa biTTi:Dini: *I took voluntary retirement*
I left work eleven years back. I took voluntary retirement.

Example(3):
A2: idusa ma:Dutti:ni:. *I teach students as well.*
I do this also. I teach as well.

All the subjects produced well-formed ML islands and there were no evidences of ungrammatical ML islands.

3.2 Code switching: Embedded language islands and insertions:

None of the subjects produced any EL insertions. In monolingual English condition, none of the subjects switched languages. All the utterances were English EL islands with out any constituents from Kannada. However in monolingual Kannada A1, N1, and A2 showed one EL island whereas N1 did not show any EL island. The majority of EL islands were observed in bilingual contexts with A1 showing five, N1 three, A2 three and N2 two EL islands (Table 4).

Table 4: Frequency of EL islands

Subject/Language	Language/ Constituent		
	Monolingual English/ EL island	Monolingual Kannada/ EL island	Bilingual/ EL island
A1/ English	-	1	0
A1/ Kannada	0	-	5
N1 / English	-	1	3
N1 / Kannada	0	-	0
A2 / English	-	1	3
A2 / Kannada	0	-	0
N2 / English	-	0	2
N2 / Kannada	0	-	0

Example (4):
A1: nan barak munche *he left*
He left before I came.
Example (5):
N1: mu:raneyadu kelasa a:dare *diagnostic work.*
Third job is like diagnostic work.
Example (6):
A2: na:nu *vehicle park* ma:Di: manage ho:gutti:ni:
Later I park vehicle and go home.
Example (7):
N2: *but you know* eno be:re tara ma:Dbekittu
But you know I wanted to do something different.

All these findings are consistent with Myers-Scotton's (1993) hypothesis of where code-switches can occur in that the grammatical integrity of both the languages remains intact. Consider the example (4), it is evident that the structure of the EL island matches with that of the unmixed version of the sentence in Kannada i.e. "nan barak munche avaru ho:daru". This shows that there is no alternation in the syntactic structure of the sentence thus retaining the integrity of the sentence. Even aphasic utterances (EL islands) conformed to the grammatical constraints of the matrix language.

EL islands were also used to reiterate what had already been said in the matrix language mainly in the bilingual contexts by A2, N1 and N2. This highlights the preservation of ability to self-correct and suggests that spontaneous translation is not an abnormal behavior.

Example (8):
A2: alli: inda banbitu *I cook* nanu aDige ma:Dutti:ni
After coming from there I cook, I cook.

Example (9):
N1*: small bit* tagondu, ondu churu tagondu no:Dbe:ku
After taking a small bit, after taking a small bit it should be examined.

In monolingual Kannada context, spontaneous translations revealed the capability of the speakers to understand the pragmatic constraints imposed by a communicative situation. Both the controls and A1 spontaneously translated their English utterances to Kannada when interlocutor expressed his inability to understand what was being said. The EL island in English was followed by a pause before repeating it in Kannada in A1 where as the translations were smooth in controls.

Example (10):
A1: avalige *sam prablam* ide
She has some problem.
Experimenter: nanage artha aglilla (I did not understand)
A1: avalige eno tondre ide
Example (11):
N2: nana vayasu *thirty six years.*
My age is thirty six years.
Interlocuter: esTu? (How much?)
N2: illa muvatuaru varsha.
No thirty-six years.

None of the aphasics produced any utterances that did not match the morphosyntactic structure of the base language i.e. Kannada.

3.3 Code switching: Matrix language + Embedded language constituents:

There were no ML+EL islands or borrowings in the monolingual English context in any of the subjects (Table 5).

In terms of borrowed forms, a lot of them were seen but such utterances were considered as ML islands as borrowed forms are very highly integrated into the base language.

A1 and A2 produced nouns, verbs, and conjunctions as ML+EL islands where as N1 and N2 produced nouns, adjectives and verbs as ML+EL. Only aphasics inserted conjunctions and fillers. The majority of lexical insertions were from the categories of nouns and verbs thus stressing the fact that insertions can be from any grammatical category and need not necessarily be content words.

Table 5: Number of ML+EL and borrowed forms in subject's utterances

Subject/ Language	Language/ Constituent					
	Mon. Eng./ ML + EL	Mon. Eng./ Borrowed forms	Mon. Kan./ ML + EL	Mon. Kan./ Borrowed Forms	Bil./ ML + EL	Bil./ Borrowed Forms
A1/ English	-	-	2	4	2	0
A1/ Kannada	0	0	-	-	5	2
N1/ English	-	-	0	0	2	1
N1/ Kannada	0	0	-	-	0	0
A2/ English	-	-	2	2	4	2
A2/ Kannada	0	0	-	-	0	0
N2/ English	-	-	2	2	2	1
N2/ Kannada	0	0	-	-	0	0

Some aphasics appeared to be accessing the second language to meet the lexical demands of the interaction more often than normal subjects and this becomes very clear looking at following examples.

Example (12):
A1: avaru ella *teach* ma:Duttare
All of them teach.
Example (13):
A2: nanu avarige *guide* ma:Duttini
I guide them.
Example (14):
N1: *usually* nan illige naDkonDu baruttini
Usually I come here by walk.
Example (15):
N2: ondu *isolated* jagadali college ittu
College was in one isolated place.

Even in ML+EL, self-corrections were noted in A1, N1 and N2 where they changed the word to its Kannada counterpart in monolingual Kannada context.

Example (16):
A1: mane hattira:ne ondu *big*..... doDDa mara ide
Near my house there is a big tree.
Example (17):
N1: nanu patshalealli *work* kelasa ma:Duttini
I work in a school.
Example (18):
N2: uruge *urgentagi* begane hogabekittu aDake isTu dina baraka:glila
I had to go to village urgently so could not come for many days.

The nature of self-corrections in normal and aphasics differed only in terms of presence of pauses and hesitations in aphasics in contrast to smooth self-corrections in the form of translations in the controls.

3.4 Levels of mixing

The results were analyzed for the levels of mixing between the two languages also. Lexical-semantic level mixing is noted in all the subjects and has already been described in the section on ML+EL islands. Number of evidences of morphological mixings was evidenced in all the subjects [examples (19), (20), (21) and (22)].

Example (19):
A1: ella oTTige ondu *kamparTmenTalli* idi:vi
We all were together in one compartment.
Example (20):
N1: na:nu kelsakke *ka:ralli* ho:gutini
I go for work in the car.
Example (21):
A2: avaru *principalagi* kelasa ma:Duttare
He is working as a prinicipal.
Example (22):
N2: namma kollejalli doDDa samelana ittu
There was a big conference in our college.

In all these instances a bound morpheme from Kannada is affixed to a free morpheme in English and all the four instances do not show any difference in the way in which morpheme affixation takes place. In examples (19), (20) and (22) a locative case marker '-alli' has been attached to the free morpheme in English whereas as in example (21) a dative post position '–agi' has been attached to the word principal. A1 and A2

showed four whereas N1 showed two and N2 showed one instance of morphological mixing.

All the subjects suggested through verbal and nonverbal cues that the bilingual context was easier for them compared to monolingual contexts and that they used mixed languages very frequently in their daily life. Within monolingual situation also all subjects found it easier to communicate in monolingual English than in monolingual Kannada.

4. Discussion:

The results of present study are discussed with reference to earlier studies by Perecman (1984); Munoz, Marquardt and Copeland (1998) and Krupa (2002) that specifically discuss code switching in bilingual aphasics.

The results of the present study point to similarities and differences in code switching between normal and aphasic bilinguals. In general, aphasics showed increase in the quantity of code switching as revealed by increased instances of ML+EL constituent, EL shifts, ML shifts, lexical-semantic and morphological code switching. All the subjects produced code-switches that maintained grammatical integrity of base language and thus could be accounted for by MLF model. There was only a slight increase in the quantity of code switching and no qualitative differences in the type of code switching among controls and aphasics. These similarities and differences in code switching suggest that aphasics adapt normally occurring code switching patterns to enhance their communicative effectiveness.

Aphasic as well as normal subjects switched languages even in monolingual context i.e. monolingual Kannada context. Present findings could be accounted for by the fact that English is usually used in formal discussions and thus mixing is not very acceptable where as mixing words from English into Kannada is acceptable form due to generally understood prestigious status of English language in the community. There were instances of switching languages with monolingual interlocutors by normal as well as aphasic bilinguals that a behavior considered abnormal by Perecman (1984) and Grosjean (1985) earlier. In the present study it is evident that even normal bilinguals break these pragmatic rules as has been reported previously by Munoz, Marquardt and Copeland (1998) in Spanish-English bilinguals, Bhat and Chengappa (2002,2003) in normal Hindi-English and Kannada-English bilinguals. These findings are also supported by Yaron's (2000) observation that cognitive motivation is so strong for a bilingual speaker that at times it overrides the social communication constraints on discourse leading to unintentional code switching.

There are several explanations given for lexical level switching in terms of availability of lexemes in a particular language. Some words or concepts might be more available in one language than the other and are expressed in that particular language e.g. Kannada equivalent of word cook is "aDige ma:Duttini" which would tax the memory as well as production system of an aphasic. Thus he/she would prefer to use cook instead,

which is easier to produce as well as retrieve. There are several explanations given for code switching in terms of language dominance, bilingual memory systems, usage in daily life but none have collectively or individually satisfactorily described the motivations behind lexical level code switching (Heredia, & Altarriba 2001). More thorough investigations however are needed in this direction in normal as well as aphasic bilinguals to explain selection of lexical items from one language or the other.

In contrast to the results of earlier studies (Munoz, Marquardt and Copeland, 1998 and Krupa 2002) one contradictory result found is increased code switching in first language as compared to English. In normal Kannada-English bilinguals also Bhat and Chengappa (2003) reported similar results. Heredia and Altarriba 2001, suggest that after a certain period second language takes over the first language and this is termed as a language shift. The active use of second language for long time could result in concepts becoming more accessible in that language. These observations could explain the present results as all the subjects had used English actively in their adult life and aphasics used English frequently even in post morbid period.

Spontaneous translation was noticed in both aphasics and normals either after a request from the partner or on self-correction in monolingual conditions. Spontaneous translation thus acted as a communicative strategy as it was used to overcome a communicative breakdown rather than a deficit behavior as Perecman (1984) believed earlier.

Only one result that differentiated aphasics from normal bilinguals was very evident pause and hesitation before translation of the English words into Kannada in monolingual Kannada context. This may suggest a difficulty in lexical retrieval forcing the bilingual aphasics to use the translational equivalent to communicate. This suggests that aphasia may selectively affect lexical retrieval in one language while sparing the access in the other language. This behavior can also be classified as a communicative strategy as aphasics use it to repair communication breakdown resulting from inability to retrieve lexical items in one language.

Morphological and lexical semantic level mixing is evident in all the subjects. These findings rule out the nature of morphological mixing as being abnormal as stated earlier by Perecman (1984). Mixing at the level of morphemes is a common occurrence in normal Kannada-English bilinguals as revealed by an earlier study by Bhat and Chengappa (2003). The mixing of morphemes also suggests existence of sentence as a concept and that assignment of the language takes place only at a later stage as reported earlier by Yaron (2000) The instances of lexical mixing are more pronounced than morphological mixing suggesting the susceptibility of lexical system for an earlier breakdown in normals as well as aphasics. It may also point out that lexicon may be more loosely bound than other levels of language.

Munoz, Marquardt and Copeland (1998) and Krupa (2002) reported frequent occurrence of ungrammatical code-switches, revisions and EL insertions in their bilingual aphasics, which is not reported in present study. This could be a reflection of language usage patterns of the bilingual aphasics. Both the aphasics in the present study have been learning English from a very early age and continued using it even in their post morbid

days. Thus all our subjects could be considered as balanced bilinguals and this could be a reason for divergent results in comparison to earlier studies. These findings stress the importance of documenting detailed language history of pre and post morbid period in order to accurately assess the communicative behavior of bilingual aphasics.

As is obvious from the results, monolingual situations were more difficult for a bilingual aphasic to communicate. Any test that is strictly administered in monolingual conditions may thus underestimate the capacities of a bilingual aphasic and restrict the rehabilitative options. Especially in multilingual country like India, it would be a better idea to incorporate assessment in bilingual context while testing a bilingual aphasic. In initial part of rehabilitation services, providing encouraging option of communicating in bilingual manner may reduce the frustration of not being able to communicate. Apart from this, cueing in a different language or providing a translational equivalent may help the patient to retrieve words and could be considered for therapy. However one needs to consider everyday real life contexts of communication as these strategies will help the patient only in bilingual situations.

In conclusion, results point to the importance of factors such as social context, pre and post morbid language skills and systematic analysis of bilingual's languages in different communicative contexts as important factors in evaluating code switching. The findings indicate clinical necessity of modifying existing methods of evaluation as well as therapy to suit the individual needs of bilingual aphasics considering the heterogeneous nature of the condition.

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The ASRT has proposed three initiatives that must be addressed to aid in correcting the current workforce problem: 1) Recruitment of new students and retention of existing technologists; 2) The upgrading of the education and skills of the R.T. work force; and 3) The restructuring of the medical imaging and radiation therapy workplace into a more productive and attractive place to work. (19) In an effort to fully develop guidelines and strategies the ASRT has generated a Recruitment and Retention Tool Kit that provides employers as well as educational programs valuable information that can aid in growing and developing the current workforce. (20)

Discussion

The University of Alaska Anchorage (UAA) developed an Associate of Applied Science Degree in Radiologic Technology. Program was engineered largely based on findings of a joint UAA Alaska State Hospital and Nursing Home Association (ASHNHA) survey, *Alaska's Allied Health Workforce: A Statewide Assessment.* (17) Considerations of previously cited recommendations contributed greatly to the formation and development of the program's mission and goals. Furthermore, identification of professional and community needs as well as educational trends established the framework for completing program creation.

An Advisory group was assembled and provided recommendations regarding the nature, length, and degree required for career entry radiologic technologists. Educational objectives where identified and conform to national curriculum guidelines established by

the American Society of Radiologic Technologists (ASRT), certification eligibility requirements determined by the American Registry of Radiologic Technologists (ARRT), and program integrity and assessment criteria outlined by the Joint Review Committee on Education in Radiologic Technology (JRCERT). The program length is 5 consecutive semesters. Three pre-major course requirements were identified. (21-23)

The program design was formulated based on limited consultation work with community imaging professionals. A working draft was submitted for review by the AAS Advisory Board and accepted. Radiologic Technology education has been historically modeled on the 24-month vocational education prototype with its genesis in the hospital environment culminating in a certificate or diploma. The accepted draft was largely based on a two-year six-semester model traditionally used by community colleges and universities in the United States. The faculty based program design on new developments and technological advances within the profession, an increasing demand for career entry practitioners, the lack of sufficient graduates to off-set market demands and professional attrition, suggested guidelines proposed by the PEW Health Professions Commission's reports, and the recent experience with professional program accreditation and certification eligibility guidelines. (4-5) The original program proposal was ill conceived, structured on an antiquated model, and did not accurately reflect recent changes in educational requirements all of which necessitated a reorganization and restructuring of course sequencing and content which parallels current professional career entry.

The AAS in Radiologic Technology consists of 17 professional courses totaling 47 credit hours of which 18 are clinical practicum credits equating to approximately 1200 clock hours. The remaining 15 credit hours are comprised of general university requirements. Community partnerships have been established and will be expanded beyond the local Anchorage area. Evaluation and assessment activities have been outlined to address program accountability and integrity for continuous improvement.

The Medical Imaging Sciences Department worked closely with the University of Alaska Fairbanks in an effort to expand the delivery of the program. Mechanisms for distance delivery of the curriculum have been investigated and will require additional research to identify cost effectiveness and practicality of this delivery method.

The development of the Radiologic Technology program provides a valuable resource for the local, state, regional, and national health care community. Moreover, it establishes educational opportunities where none have existed before in a highly desirable and economically viable occupation. Finally, the establishment of a cooperative working agreement with the University of Alaska Fairbanks to address similar community concerns regarding a lack of qualified technologists available for employment has been concurrently developed. The Tanana Valley Campus of UAF and Fairbanks Memorial Hospital have secured personnel for the sole purpose of providing UAA with program support for implementation of distance course work for the fall of 2002.

Conclusion

The development of a Radiologic Technology education program at the University of Alaska Anchorage began in the fall of 2001 with the development and delivery of trial courses. Nine trial courses were developed over the first three semesters through the summer of 2002. These were intentionally created to coincide with the proposed degree program that was also under construction. In June 2002 the University of Alaska Board of Regents approved the AAS degree in Radiologic Technology. Application for program recognition from the ARRT was concurrently submitted and acknowledgement was received in August. Moreover, program recognition was sought and officially granted in November 2002 by the Northwest Association of Universities and Colleges.

In addition to creating distance courses the Medical Imaging Sciences Department is working with Providence Alaska Medical Center to secure an on-site Clinical Education Coordinator that provides primary supervision of all assigned students as well as assume instructional responsibilities for the program's procedures lab. This will afford the University the opportunity to expand the incoming class size in the Anchorage area.

It was the intent of the University of Alaska Anchorage to seek programmatic accreditation through the JRCERT with tentative program review and future site visit. This would provide the program with measurable outcomes from the first two classes of graduates. Unfortunately, the University system has no plan to develop stability within the program and has elected to continue the program without permanent faculty.

With the information obtained from the Pew Health Professions Commission reports as well as the comprehensive and ongoing investigations of workforce issues by AHA, IHA, HANYS, MHHP, VHHS, BHS, ARHC and several others the development of the AAS in Radiologic Technology program at the University of Alaska Anchorage is attempting to meet the needs of the profession with a creative and expansive approach that will continue to respond to the needs of the changing health care environment.

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Table 1. Educational recommendations for the current workforce crisis.

AHA 2002 Report	Work with local community colleges, universities, and other educational organizations to develop creative approaches to educating students…offer scholarships, internships, and externships… .provide professional development opportunities for current employees….address shortages of faculty, clinical training sites, and other capacity barriers….identify realistic expectations for new graduates competencies and readiness to work….. and organize local or regional roundtables of hospitals executives, educators, and clinical leaders to provide feedback .
IHA (New York)	Develop courses and programs targeting outreach to current health care workers, high school students, potential continuing education students, and community college students throughout Upstate; ……distance learning modules that can be replicated and/or transmitted to all locations in New York State following an inclusive curriculum development process; …..employee incentive strategies for the workforce development program success. This would include funding for transportation, tuition, scholarship/loan forgiveness programs, subsidized day care, and wage enhancements and subsidies for replacement staff time and for employees during training.
HANYS (New York)	Initiatives to expand workforce supply, including investment in training and education and improving the capacity to market health careers to youth and people seeking second careers.
MHHP (Minnesota)	Partner with education institutions, government agencies, and professional and accrediting organizations, to assure that individuals can easily enter into and advance within the health care field.
VHHS (Vermont)	Provide career opportunity information as a component of a comprehensive recruitment program. Target junior and senior high school students & career changers…..coordinate efforts between primary, secondary, post-secondary education and the marketplace….identify rural state educational needs at all levels….identify desired level of education for health professions….matriculation, internship and financial aid programs need to be developed
FHA (Florida)	Increase funding to educational programs to expand availability and create an attractive marketing approach in selling health careers to more high school students.
ASRT	Recruitment of new students and retention of existing technologists. Promote the upgrading of the education and skills of the R.T. work force. Restructure the medical imaging and radiation therapy workplace into a more productive and attractive work environment.
SIU Carbondale (Illinois)	Review education program capacity to meet local, regional, and national demands. Work with health care providers to develop cooperative strategies for student and graduate placement in rural communities. Review and prepare programs for eventual baccalaureate requirements for career entry. Monitor regional health professions' workforce demands and evaluate effectiveness of graduate placement.

Table 1. cont. Educational recommendations for the current workforce crisis.

University of California San Francisco	Require health education programs to meet skill requirements that reflect general employment skills as well as clinical and technical competence....improve work environments that are committed to high quality, flexibility, and service orientation and culturally diverse. Build new participatory structures that involve labor, education, and the allied and auxiliary workforce in change and quality improvement processes. Improve regulation of professions, occupations and health care facilities in order to effectively use trained allied and auxiliary workers to deliver health care.
ASHNNA (Alaska)	Develop allied health occupations where none have been available in the state. Expand delivery of existing allied health programs to communities beyond the Anchorage area. Expand delivery of developing programs such as Radiologic Technology and Pharmacy Technician to other locales in the state.
PEW Commission Reports	Focus on restructuring the mission and organization of allied health education programs through partnerships with delivery systems, professional associations, educators, regulators, consumers, and the public.....structure allied health curriculum on related discipline clusters, multi-skilling and interdisciplinary core curricula....improve student and professional articulation and career ladders within disciplines and between professions....develop new and improve existing education-practice linkages with diverse care delivery environments, such as managed care, home health care, and ambulatory care, for the benefit of both faculty and students.....recruit minority, disabled, and disadvantaged students and practitioners that reflects the cultural diversity of the nation's population....promote faculty leadership skills and competence in clinical outcomes and research.....establish innovative collaborations among professional associations....improve the collection, evaluation and dissemination of data and innovations related to allied health education, training, practice, and regulation....facilitate an environment to assist in changing professional training to meet the demands of the new health care system....continue to move education into ambulatory practice....encourage public service of all health professional students and graduates.....identify and standardize auxiliary health competencies that are learned on the job.....facilitate the continuous retraining of allied health professionals.

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